## REMARKS

Claims 43, 45-48, 50, 51, 53, 55-59, 61-64, 66, 67, 69, 71-75, 77-80, 92, 93, 95, 97-101, 103-106, 108, 109, 111, and 113-120 remain pending in this application. Claims 43, 45-48, 50, 51, 53, 55, 56, 58, 59, 61-64, 66, 67, 69, 71, 72, 74, 75, 77-80, 92, 93, 95, 97, 98, 100, 101, 103-106, 108, 109, 111, 113, 114, and 117-120 have been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record. Claims 44, 49, 52, 60, 65, 68, 76, 91, 94, 102, 107, and 110 have been canceled without prejudice or disclaimer of subject matter and will note be mentioned further. Claims 43, 51, 59, 67, 75, 93, 101, 109, and 117-120 are independent.

Applicant has corrected the typographical error in Claim 43 kindly noted by the Examiner.

Claims 43-53, 55-69, 71-80, 91-95, 97-111, and 113-120 were rejected under 35 U.S.C. § 102(3) as being anticipated by U.S. Patent 6,141,446 to Boliek et al.

The present invention is directed to improvements in the field of data compression, and more particularly digital image compression.

Claim 43 is directed to a method of compressing data, the data comprising a plurality of transform coefficients. Each transform coefficient is expressible in a format including a plurality of bit symbols, the format comprising a number of leading zero bit symbols and remaining bit symbols. The method includes the step of (a) entropy encoding a number representative of the number of leading zero bit symbols, not previously entropy coded, of a current transform coefficient based on a context of a number of transform coefficients or part thereof surrounding the current transform coefficient. The context is

based on the number of non-zero transform coefficients surrounding the current transform coefficient. The method further includes the step of (b) processing another transform coefficient, not previously entropy coded, in accordance with step (a).

Boliek, as understood by Applicant, relates to a method and apparatus for encoding and decoding data that includes generating transformed signals in response to input data.

Page 4 of the Office Action states that Boliek teaches "(a) entropy encoding a number representative of said number of leading zero bit symbols (see "entropy coding" shown at 206 of figure 2 and mentioned at col. 10, line 25), not previously entropy coded (see "P" shown in figure 13), of a current transform coefficient based on a number of coefficients or part thereof surrounding said current transform coefficients (see figure 13 which shows the neighborhood coefficients for every coefficient of a coding unit according to col. 3, lines 41-42)," and "(b) processing another transform coefficient, not previously entropy coded, in accordance with step (a) (i.e., the "processing logic" mentioned in col. 29, lines 1-39 and detailed in figure 21 for repeating or processing another transform coefficient)."

Applicant submits that nothing in Boliek would teach or suggest the method of Claim 43. Specifically, Boliek describes (at column 10, lines 24-25, with reference to Fig. 2) that "the results of ordering and modeling comprise decisions (or symbols) to be coded by the entropy coder 206." It is clear that this is a general statement, and cannot be said to teach or suggest the feature defined in Claim 43 of "entropy encoding a number representative of said number of leading zero bit symbols."

In addition, Boliek describes (at column 29, lines 1-39, with reference to Fig. 21) that "the processing logic models each bit of each coefficient with the horizon context model (processing block 2107)," and "at processing block 2108, the processing logic codes each bit of each coefficient." (Emphasis Added.) Applicant submits that nothing in this portion, or in the citation as a whole, would teach or suggest the feature of "processing another transform coefficient, not previously entropy coded, in accordance with step (a)" viz a viz "entropy encoding a number representative of said number of leading zero bit symbols, not previously entropy coded, of a current transform coefficient," as recited in Claim 43.

Nothing has been found in Boliek that would teach or suggest the mentioned steps of entropy encoding and processing as recited in claim 43. Boliek discusses that the image is transformed (using either a transform-style or a binary-style coding) and then entropy encoded (see column 9, line 1, to column 11, line 39). These two alternate coding techniques are used in different circumstances (see Fig. 21, and in particular steps 2108, 2111; column 29, lines 1-10 and lines 23-25; column 11, line 40, to column 12, line 25; and column 9, lines 53-54). Boliek describes that in the binary-style processing, the image is initially pre-processed by Gray coding and then the bits of the pixels are encoded bitplane by bitplane using a context in coding block 204 and coder 206 (see column 10, lines 34-35, lines 52-53, and lines 56-61). Boliek further describes that the same binary encoder is used to code data from both the transform-style and the binary-style (see column 11, lines 4-6). In the case of the transform-style, the "bit-planes" are importance level planes of the transform coefficients (see column 10, lines 19-23), and moreover the image is still progressive by bit-plane using the dual mode system (see column 11, lines 29-31).

Indeed, Boliek specifically describes that in the case of transform-style coding the bits of the transform coefficients of the frequency bands are encoded bitplane by bitplane (see column 23, lines 26-28; column 23, lines 41-56; column 24, line 14, to column 25, line 2; and Fig. 20, tables 7 and 8). Boliek is completely silent regarding the feature recited in Claim 43 of "entropy encoding a number representative of said number of leading zero bit symbols, not previously entropy coded, of a current transform coefficient."

Further, Boliek may entropy encode on a bit-plane basis, in the sense that the bit-planes are encoded one by one in turn, where each bit-plane comprises a plurality bits of like order from a corresponding plurality of coefficients. However, Applicant respectfully traverses the remarks at page 8 of the Office Action, which states that "Boliek does teach encoding each coefficient," and "for example, column 24, lines 18-19 of Boliek states 'each coefficient is coded independently'". Applicant submits that the Office Action takes this statement of Boliek out of context. Boliek, at column 24 lines 16-19, in fact states that:

> The determination of whether the look ahead is used is based solely on causal and deterministic data. If not, no data is coded and each coefficient is coded independently as described in the following sections.

The mentioned sections of Boliek describe that the bits of the coefficients of a frequency band are coded bit-plane by bit-plane (see column 23, lines 41-57; column 26, lines 47-49; column 27, lines 55-65; and Figs 20 and 36). Specifically, Boliek discusses a process for encoding blocks of 16 target bits of the current bit-plane (importance level) at a time (see column 24, lines 50-60). If the look ahead is attempted and fails, or is not attempted, the 16 target bits of the bit plane are coded individually (see column 24, lines 66-67). Thus, in these circumstances, it is the 16 target bits of the corresponding 16

coefficients in the current bit-plane that are each coded independently. The feature of Boliek of encoding bit-plane by bit-plane is completely contrary to the feature of Claim 43 of "entropy encoding a number representative of the number of leading zero bit symbols, not previously entropy coded, of a current transform."

For all of the foregoing reasons, Claim 43 is believed to be clearly allowable over Boliek.

Independent Claims 59, 75, 101, 117, and 119 each include similar features to those discussed above in connection with Claim 43. Accordingly, these claims are believed to be patentable for substantially similar reasons to those discussed above in connection with Claim 43.

Claim 51 is directed to a method of compressing data, the data comprising a plurality of transform coefficients. Each transform coefficient is expressible in a format comprising a plurality of bit symbols. The method includes the step of (a) entropy encoding one of the bit symbols, not previously entropy coded, of a current transform coefficient based on a context of a number of surrounding bit symbols and on whether or not the most significant bit symbol of the current coefficient has been previously entropy coded. The context is based on the number of non-zero transform coefficients surrounding the current transform coefficient. The method further includes the steps of (b) repeating step (a) a predetermined number of times for the current transform coefficient, and (c) processing another transform coefficient, not previously entropy coded, in accordance with steps (a) and (b).

The Office Action states that "Boliek further teaches repeating entropy coding a predetermined number of times for the current transform coefficient (see items

2104 and 2110 of figure 21) as required by claims 51 and 93." (See page 4, lines 17-20 of the Office Action.) Applicant respectfully disagrees with this statement. Firstly, the cited portions of Boliek (i.e., items 2104 and 2110 of Fig. 21) relied on in the Office Action in support of the rejections completely fail to disclose or suggest the aforementioned steps recited in Claim 51. Step 2104 of Fig. 21 of Boliek is a conditional step that tests whether a further wavelet transform is desired. In the event this step 2104 returns "YES" a further wavelet transform is applied to the LL coefficients. Otherwise, the coefficients are converted to sign/magnitude format (see column 29, lines 10-19). It is clear that step 2104 is concerned with wavelet transformation and has nothing to do with entropy encoding. In addition, step 2110 of Fig. 21 of Boliek is a conditional step that tests whether there are more tiles in the image. If there are more tiles in the image the encoding process is repeated on these tiles; otherwise, the process terminates (see column 29, lines 26-30). The latter is a general statement, and cannot be said to disclose or even suggest the aforementioned entropy encoding, repeating, and processing steps as recited in Claim 51.

Nor does Boliek as a whole disclose or even suggest the mentioned steps of entropy encoding, repeating, and processing as recited in Claim 51. In particular, Boliek is completely silent regarding the feature of "entropy encoding one of the bit symbols, not previously entropy coded, of a current transform coefficient based on a context of a number of surrounding bit symbols and on whether or not the most significant bit symbol of the current coefficient has been previously entropy coded," as recited in Claim 51.

Furthermore, Boliek appears to entropy encode the transform coefficients on a bit-plane basis, in the sense that the bit-planes are encoded one by one in turn, where each bit-plane comprises a plurality bits of like order from a corresponding plurality of

coefficients. At the bit-plane level, Boliek encodes blocks of bits, or in some circumstances the individual bits of the corresponding transform coefficients one after another. Namely, in Boliek, once one bit of a transform coefficient is encoded, then Boliek proceeds to encode another bit of another transform coefficient in the same bitplane. On the other hand, the method of Claim 51 entropy encodes a bit symbol, not previously entropy coded, of a current transform coefficient, repeats the latter step a predetermined number of times for the current transform coefficient, and then processes another transform coefficient, not previously entropy coded, in accordance with the latter steps.

For at least these reasons, Claim 51 is believed to be clearly allowable over Boliek.

Independent Claims 67, 93, 109, 118, and 120 each include similar features to those discussed above in connection with Claim 51. Accordingly, these claims are believed to be patentable for substantially similar reasons to those discussed above in connection with Claim 51.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

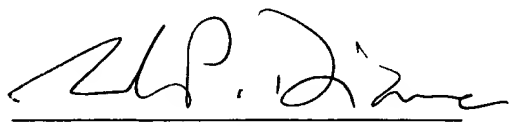
The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

This Amendment After Final Action is believed clearly to place this application in condition for allowance and its entry is therefore believed proper under 37 C.F.R. § 1.116. At the very least, however, cancellation of Claims 44, 49, 52, 60, 65, 68, 76, 91, 94, 102, 107, and 110 eliminates all issues relating to those claims. In any event, entry of this Amendment After Final Action, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, the Examiner is respectfully requested to contact Applicant's undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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